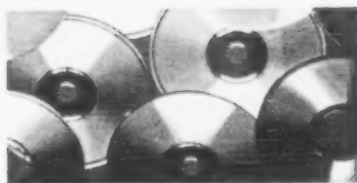




Newfoundland and Labrador's Blueprint for Sustainable Economic Growth Through Innovation

A Discussion Paper



Introduction

In today's society, innovation, technology and knowledge are the main drivers of economic competitiveness and productivity. If successful, these drivers lead to more prosperous communities and an improved quality of life for all citizens.

But what is innovation? People often think of it as significant technical advances or something that occurs in the labs of universities or large corporations or is driven by governments with growth agendas. While we can't downplay the importance of technical research and development, innovation should not be viewed as the sole responsibility of universities, large corporations and governments.

On a basic level innovation can mean using ingenuity to more efficiently manufacture a product or enable a process, but it also means using what is available to us and adapting it to our needs. In other words, it means a willingness to change. For entrepreneurs and companies, ingenuity, adaptation and change are essential building blocks to success.

In many institutional and larger corporate settings, innovation can be a process of creation, exchange, and application of knowledge to either improve or develop new products, services, or techniques. Success is achieved when these factors are utilized to generate wealth (commercialization), gain efficiency, or improve quality of life.

Innovation occurs throughout all sectors, and at all levels. It is driven by the small business owner looking to find a better way to get products to customers, and by communities seeking to attract new industries. It is also motivated by a teacher looking for better ways to educate students in rural communities and by artists wanting to bring their creative interpretation of an idea to the world.

For Newfoundland and Labrador, with its diverse mix of small, medium and large businesses, rural and urban communities and public and private institutions, we believe the most useful definition for innovation that can be applied is as follows:

Innovation is the creation, sharing and implementation of new ideas resulting in economic value and/or social gain.

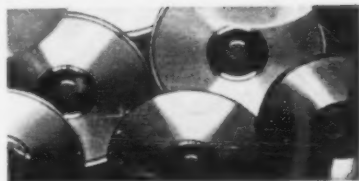
Innovation, however, doesn't just happen. An ability to innovate needs to exist, but equally important is an environment that encourages innovation. This means fostering a culture that values and encourages skills and knowledge – creative, scientific, technical, market, management, legal, and production, as well as provides the tools – access to infrastructure, fiscal resources, and research and business networks. This culture must also encourage risk-taking and build confidence in our abilities and in the abilities of others. Finally, this culture must reward entrepreneurship and continually challenge our people and organizations to do better.

Many examples of innovation exist in Newfoundland and Labrador, from inventions born of necessity to high-tech advances that have garnered world-wide markets. These have occurred across a broad spectrum of industries from natural resource processing to nutraceuticals.

In February 2002, the federal government launched a national innovation strategy. Its goal was to ensure that Canada maintains its high standard of living and quality of life by remaining a competitive and desirable place to do business in the new, global, knowledge-based economy. A number of provinces followed with their own innovation agendas or strategies building upon or tying into the federal strategy. To date, seven provinces have released specific innovation strategies, while the remainder have incorporated an innovation focus as part of their broader economic strategies. In the 2004 Speech from the Throne, the Government of Newfoundland and Labrador committed to building a sustainable, diversified economy in which people and communities throughout the province can prosper and thrive. To achieve this, government's approach to economic growth and recovery will be aggressive on many fronts and tied to an innovation strategy.

Sea Health Limited, based in the town of Fleur de Lys, has licensed a locally-patented process that extracts 100% of the beneficial omega-3 fatty acids from seal oil. Standard processes result in a presence of only about 20% omega-3 compounds.

innovation **fact**



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Why a Newfoundland and Labrador Innovation Strategy?

To the extent that necessity is the mother of invention, we have a wealth of experience. Our ability to respond to new challenges is well established. Now we must build on our past to meet the challenges of tomorrow.

In this province, substantial investments have been made by the Government of Newfoundland and Labrador as well as individual federal departments and agencies such as the Atlantic Canada Opportunities Agency, National Research Council and Industry Canada to foster a diversified economy. These investments have realized significant economic returns and have helped stimulate innovation and growth. However, a more cohesive approach involving entrepreneurs, economic development groups, industry, government, non-governmental organizations, research and educational institutions and labour is required to achieve our full potential.

The Government of Newfoundland and Labrador's innovation strategy will provide a practical approach to enhance the province's innovation performance, thereby contributing to a stronger, more diversified economy. More specifically, it will show how the province can: (1) increase community and economic competitiveness throughout all regions; (2) attract new investments; (3) leverage federal investment; (4) advance knowledge-based developments; and (5) build an overall culture of innovation.

One of the main challenges will be to help people understand that an innovation strategy is as important to individuals operating community-based businesses as it is to global high-tech industries. People often do not think of themselves as innovative, and equally important, they do not recognize the value in sharing their experience with others.

Canada's Innovation Strategy

The federal strategy goal is to build on the investments already made in research and innovation, to make essential research and technological expertise available to firms of all sizes, and to facilitate access to venture capital financing. Specifically, the strategy examines the role of innovation in four key areas:

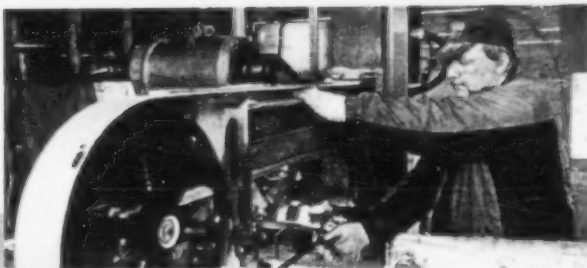
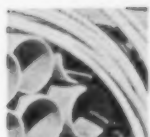
- *Knowledge Performance*: encouraging Canadian firms to reap more benefits from creating knowledge, bringing these ideas to market, and increasing Research and Development (R&D) investment by all sectors
- *Skill*: ensuring that Canada has enough highly-qualified people for a vibrant, knowledge-based economy
- *The Innovation Environment*: modernizing business and regulatory policies to support investment and excellence in innovation
- *Strengthening Communities*: supporting innovation at the local level, so that communities continue to be magnets for investment and opportunity

In the 2004 Speech from the Throne, the federal government addressed the importance of improving the nation's R&D performance in order to foster a more innovative economy. In addition to increasing R&D, the federal government's innovation agenda is based on developing a highly skilled work force and a positive business climate. In regions with strong economic performance, industry creates the pull for innovation and commercialization. It creates demand for R&D, provides funding, conducts a majority of the R&D work, and capitalizes on the outcome. This is a key engine of economic development. In more innovative economies, the ratio of industry applied R&D is at least three to four times that of university R&D, and twice that of universities and governments combined. In this regard, the federal government is committed to doubling expenditures on R&D. It also recognizes the role to be played by the private sector in improving Canada's R&D performance to allow Canada to be among the top five countries by 2010 from its current 12th place ranking (OECD 2001 data).

In collaboration with the provinces, territories, key stakeholders, universities, communities and industry, the federal government is committed to ensuring that Canada becomes a world leader in:

- developing and applying the path-breaking technologies of the 21st century
- creating and commercializing new knowledge
- promoting continuous learning
- training skilled workers
- ensuring a strong and competitive business environment
- strengthening the social economy





What is an Innovation Blueprint?

Despite our economic progress, studies show that Newfoundland and Labrador's innovation performance is lagging behind the rest of the country. A number of factors may have contributed to this including:

- limited access to private sector risk capital and other forms of growth financing
- a relatively low investment in research and development by industry
- limited resources at our university and other institutions to carry out most R&D activities compared with other regions
- underdeveloped innovation-based sectors and clusters
- inadequate links among post-secondary institutions, industry and communities
- insufficient knowledge-based infrastructure, particularly in rural areas
- entrepreneurs, managers and professionals experienced in utilizing innovation and building innovative enterprises need to maintain skills
- a continuing out-migration of knowledge workers

These innovation gaps hamper growth and the ability to compete nationally and internationally.

Designing and developing a provincial strategy to address the above challenges is not easy. There have been many local, national and international studies and reports on innovation. Some prescribe a detailed approach to support innovation while others are more general. The challenge for Newfoundland and Labrador is to design and develop a strategy that presents a series of principles and objectives, while at the same time identifies an approach with sufficient opportunities to give the strategy meaning and momentum – and results.

The strategy must be many things:

- it must be *cobesive* – by pointing out and helping to ensure all elements for an innovative economy are present
- it must be *creative* – by helping to create an environment where innovation can be sustained to grow and thrive
- it must be *insightful* – by providing the key elements that affect this province's innovation performance
- it must be *practical* – by using tangible actionable suggestions so our province can become more competitive and productive

This strategy cannot be developed and owned solely by the provincial government. It must be the province's blueprint. It must reflect the needs of all stakeholders including education and training institutions, small and large businesses, labour, technology industries, the resource sector, cultural organizations, communities and the government sector. Our educators, financiers, unions and public administrators all have a role to play – they have to identify and help implement the skills development, financing mechanisms, public policies, programs and decision-making processes to encourage the growth of innovative organizations and an innovative culture in our province. A role exists for all sectors and communities of interest to support innovation.

Cape St. Mary's Enterprises Limited, based in St. Mary's, is a leader in the emerging field of crab and shrimp shell stabilization and production for markets in Europe and Asia. Their recent innovations in product handling and processing have resulted in reduced transportation costs and increased production capacity.

innovation **fact**



How innovative is Newfoundland and Labrador?

Before we move forward in developing an innovation strategy that outlines where we want to go and how we will get there, we have to assess where we are.

Certain core components need to be strong within our economy to support innovation. They include R&D, education and our business environment. Each of these is described briefly below.

Cathexis, established in 2001 by four Memorial University engineering graduates, is quickly becoming an innovator in the inventory tracking, asset management, and maintenance markets. Cathexis is designing and manufacturing RFID (radio frequency identification)-based readers and associated software. These are a new generation of lightweight, pen-shaped wireless readers used to manage and update intelligent products tags – the next era in barcodes.

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Research and Development

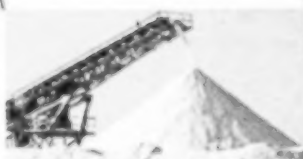
Newfoundlanders and Labradorians are known internationally for our expertise in a number of areas. Our expertise in cold ocean and marine technologies is recognized world-wide and we continue to build momentum for a broad-based ocean and marine technology cluster.

Innovation in the province is supported by world-class facilities, notably those located within Memorial University of Newfoundland and the College of the North Atlantic. MUN houses leading-edge research and development centres, including the:

- The Centre for Applied Health Research
- C-CORE
- Centre for Fisheries Innovation
- Ocean Sciences Centre
- Bonne Bay Marine Station
- NRC's Institute for Ocean Technology
(located on Memorial's campus)

MUN also is home to the Marine Institute with its internationally recognized centres including the:

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The College of the North Atlantic is innovative in fostering an international profile as a world class exporter of education. Most notably, it has established a state-of-the-art campus in the State of Qatar in the Middle East. It operates numerous centres such as the Manufacturing Technology Centre that provides support to the manufacturing sector, and the Digital Animation Centre in Stephenville that trains students to work in this emerging field. As well, the College's recently established office of research enhances its research capacity.

While the marine sector has been a traditional focus for R&D investment in our province, we have developed capabilities in many more areas. We conduct world-class biotechnology research. Our expertise in mobile communications, distance education and environmental systems is well recognized. We are building new companies in such sectors as remote sensing and asset tracking. Creative and effective innovation is taking place in the more traditional sectors of tourism, health and the fishery that are increasing the province's ability to compete on the world stage.

The province is also realizing improvements in information and communications infrastructure, which is essential for fostering innovation. Broadband capabilities are being built throughout the province, thereby decreasing the competitive disadvantages associated with distance and remoteness.

Notwithstanding our successes, more work is required.

This shows how Newfoundland and Labrador compares to selected other provinces, US states and European nations on a number of measures of innovation. For example, in the four Atlantic Canada provinces, we ranked third out of fourth in total R&D spending as a share of GDP in 2001 while Nova Scotia ranked first.

Measures of Innovation

	Atlantic Canada		Canada		Seven US States plus NL		European Nations	
Total R&D spending % of GDP, 2001	NL (3)	NS (1)	NL (8)	PQ (1)	NL (6)	MA (1)	NL (6)	Iceland (1)
Business R&D % of total R&D, 2001	NL (4)	NB (1)	NL (10)	PQ (1)	NL (6)	CT (1)	NL (6)	Ireland (1)
Patents filed, 1999*	NL (4)	NB (1)	NL (10)	ON (1)	NL (8)	MA (1)	NL (6)	Netherlands (1)
Venture Capital per capita, 1999**	NL (4)	NB (1)	NL (10)	ON (1)	NL (5)	MA (1)	NL (6)	U.K. (6)

*Canadian provinces 1996-1999 average

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Atlantic Canada (PEI, NS, NB, NL)

Canada (10 provinces)

U.S. states (Alaska, Connecticut, Maine, Massachusetts, N.Y., Oregon, Washington)

European nations (Iceland, Ireland, Netherlands, Norway, U.K.)

Source: Government of Newfoundland and Labrador.

Selected Indicators of Economic Development

Selected Indicators	Newfoundland and Labrador	Canadian Average
Capital investment as a % of GDP (2003)	21.8%	20.2%
Business investment as a % of GDP (2003)	19.5%	17.5%
Non-residential investment from manufacturing, professional and business services (2003)	2.3%	4.2%
Industries engaged in collaborative efforts with research facilities/institutes	16%	33%
Households connected to Internet (2002)		
- At work	25%	34%
- At school	25%	23%

Source: Government of Newfoundland and Labrador, 2004.

Research and Development

There is a perception that R&D levels among Atlantic Canadian universities are low compared to the rest of Canada and the United States. Ratios between university and industry R&D are the reverse of most innovative economies, with university research accounting for almost three times that of industry R&D. Atlantic Canada represents about 7.7% of the Canadian population, yet only 1% of the nation's total industry investment in R&D is spent in Atlantic Canada. Universities in the region are much closer to the national average, receiving 6.7% of the investment spent in Canada on university R&D.

Despite the capacity for innovation, research and development investments in the province are low and stand at 1% of GDP compared with a national average of 1.8%. The education sector has dominated this activity capturing 50% of federal investments and accounting for 63% of all research spending throughout the province compared with a national rate of just 30%.

The extent to which the private sector drives and invests in innovation is a significant indicator of a region's investment climate. In a strong knowledge-based economy, industry will account for about 70% of innovation investments. Between 1997 and 2000, the private sector accounted for 60% of investments in Canada. In Newfoundland and Labrador for the same time period, the business community accounted for 14% of total investments in innovative processes (Statistics Canada).

Education

Having a skilled, well educated and "high knowledge" workforce is a critical component to supporting innovation performance. Bricks and mortar alone will not be sufficient — we have to invest in our people and skills. The province makes considerable investments in education: about 8.5% of its GDP (1999), which is about 25% higher than the Canadian average.

University graduation at the undergraduate and master's level is on par with other provinces. However, we have the lowest number of graduates in science and technology fields (14% provincially vs. 23% nationally) and the lowest level of adult participation in continued education. We also have the lowest graduation rates at the doctorate level.

We need to focus on our ability to develop individuals with highly technical and innovative skills, and we need to ensure strong entrepreneurial and business skills exist in our province to facilitate the transfer of innovation to the marketplace. But perhaps most importantly, if we are to foster and promote a culture of innovation, we need to start with our young people.

Business Environment

Taxation impacts on the ability of a jurisdiction to attract and encourage innovation. Investors utilize corporate tax rates as a major consideration in deciding where to invest. Many international and national jurisdictions have been very successful in introducing tax credits and other financial mechanisms to encourage investment in innovation. Newfoundland and Labrador's corporate tax rates are

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competitive with the rest of the country. Our general corporate rate is 14%, our manufacturing and processing rate is 5%, and our small business rate is 5%. A more pertinent issue is our relatively high personal income tax.

Access to venture capital is another critical issue and one that continues to present significant challenges for provincial businesses wishing to grow. From 1996-2001 an annual average of \$43 million was invested in the province equaling an annual investment of about \$8 per capita. This is the lowest level of venture capital investment in the nation and considerably lower than the national average of \$85 per capita.

In recognition of this low level of private sector investment in Atlantic Canada, the federal government has implemented several initiatives. These include the Atlantic Investment Partnership, an infusion of \$410 million over five years via the Atlantic Innovation Fund (AIF) and National Research Council (NRC). The remaining challenges will be to find adequate sources of funding and to target this funding to key areas of strength with the best opportunity to stimulate sustainable economic development.

Our Future

If we are to maintain and increase our competitiveness, we must provide attractive opportunities for people to work and live in our province, while providing a quality of life that is on par, if not better than other areas of Canada and the world. A critical challenge for our economic future is to develop a common vision and the collective will to create a culture of innovation for Newfoundland and Labrador.

If Newfoundland and Labrador is to compete on the world stage, we must continue to foster an innovation culture that will retain a highly-educated and qualified workforce, provide them with modern infrastructure, offer them continuous access to learning opportunities, and encourage them to remain competitive. If we achieve all this, we will have increased our capability to attract investment.

The destination is in sight, the challenge is in getting there.

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competitive with the rest of the country. Our general corporate rate is 14%, our manufacturing and processing rate is 5%, and our small business rate is 5%. A more pertinent issue is our relatively high personal income tax.

Access to venture capital is another critical issue and one that continues to present significant challenges for provincial businesses wishing to grow. From 1996-2001 an annual average of \$43 million was invested in the province equating an annual investment of about \$8 per capita. This is the lowest level of venture capital investment in the nation and considerably lower than the national average of \$85 per capita.

In recognition of this low level of private sector investment in Atlantic Canada, the federal government has implemented several initiatives. These include the Atlantic Investment Partnership, an infusion of \$410 million over five years via the Atlantic Innovation Fund (AIF) and National Research Council (NRC). The remaining challenges will be to find adequate sources of funding and to target this funding to key areas of strength with the best opportunity to stimulate sustainable economic development.

Our Future

If we are to maintain and increase our competitiveness, we must provide attractive opportunities for people to work and live in our province, while providing a quality of life that is on par, if not better than other areas of Canada and the world. A critical challenge for our economic future is to develop a common vision and the collective will to create a culture of innovation for Newfoundland and Labrador.

If Newfoundland and Labrador is to compete on the world stage, we must continue to foster an innovation culture that will retain a highly-educated and qualified workforce, provide them with modern infrastructure, offer them continuous access to learning opportunities, and encourage them to remain competitive. If we achieve all this, we will have increased our capability to attract investment.

The destination is in sight, the challenge is in getting there.

Verafin is becoming recognized for their groundbreaking work in the financial services industry. Verafin has developed intelligent anti-money-laundering and fraud detection software that seeks out and exposes suspicious transactions in large financial databases.

Verafin is currently the dominant player in this market for credit unions across Canada.

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Competitiveness Summary of Newfoundland and Labrador, selected Canadian provinces, US states and European countries

In 2003, the province looked at how selected jurisdictions approached economic competitiveness and developed a method to assess our economy against a number of these regions. The initial framework had five themes: macroeconomic performance, economic environment, labour markets, tax and fiscal policy, and infrastructure. These themes were further defined by 19 indicators and 73 distinct measures.

The province's overall competitiveness was mixed. In general, the province performed well on measures that reflect performance over time, and less well on absolute levels of performance. This reflects the fact that while recent economic progress has been strong, the province's position relative to other jurisdictions continues to lag. For Canada, the province ranked among the top three for almost one-quarter of the 73 measures, but ranked among the bottom three provinces for almost one-half of these measures. Among the low-ranking indicators were the share of R&D funded by business and the use of private sector venture capital.



Sea-Land Technologies Inc., a company based on the Baie Verte Peninsula, registered a patent detailing a new process for the extraction of magnesium from asbestos tailings. The process, known as the Silmag Process, can extract a high grade of magnesium chloride and a porous type of silica – both valuable global commodities.

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How you can be involved



The Department of Innovation, Trade and Rural Development has contracted AMEC Earth & Environmental to assist the Department in developing the innovation strategy.

The role of the consultants is to conduct a province-wide consultation process that will allow participants the opportunity to discuss the issues and help shape the strategy. The consultants will then compile the results, and develop a list of actionable items that will form the basis of the Innovation Blueprint.

Issues to be addressed during the consultation process include:

- Access to capital (e.g. local and outside investment)
- Access to qualified workers
- Access to technology and management skills
- Enhanced public and private research and development capacity
- Collaboration between public and private stakeholders
- Commercialization

Questions to be answered during the data gathering and analysis phase include:

- What are the regional development challenges that must be met in order to foster innovation?
- How can the province's existing Research and Innovation Fund and other provincial assistance programs be enhanced to stimulate greater interaction between the university and other research organizations, as well as stimulate more commercialization and R&D?
- How can provincial organizations (e.g. educational institutions, businesses) better access federal funding for innovation?
- How can we better engage the private sector?

AMEC will conduct focus groups during January and February 2005 with representatives of various sectors and communities of interest:

Sectors include:

- Advanced technology
- Culture, heritage and tourism
- Health
- Manufacturing
- Natural resources

Communities of interest include:

- Labour
- Regional development
- Education and research
- Business and finance
- Government

The results will be presented in a series of provincial roundtables that will include a cross-section of representatives throughout the province.

Five roundtables will be held in the following locations early in 2005:

Corner Brook	March 1, 2005
Happy Valley-Goose Bay	March 2, 2005
St. John's	March 4, 2005
Gander	March 8, 2005
Clarenville	March 9, 2005

A pan-provincial session will be held on March 14, 2005 in St. John's. People will be able to participate in this session through video-conferencing.

In addition to the above consultation process, the public can have input into the strategy by contacting AMEC.

Write:

AMEC Earth and Environmental Innovation Strategy
PO Box 13216
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Innovation Strategy
709-722-7353

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The Department of Innovation, Trade and Rural Development's primary contact is:

Mr. Terry Courish
Telephone: 709-729-5652
Toll free: 800-563-2299
E-mail: tcourish@gov.nl.ca

Additional copies of this document can be obtained from the government's website at www.gov.nl.ca

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NEWFOUNDLAND AND LABRADOR
Department of Innovation, Trade and Rural Development

January, 2005